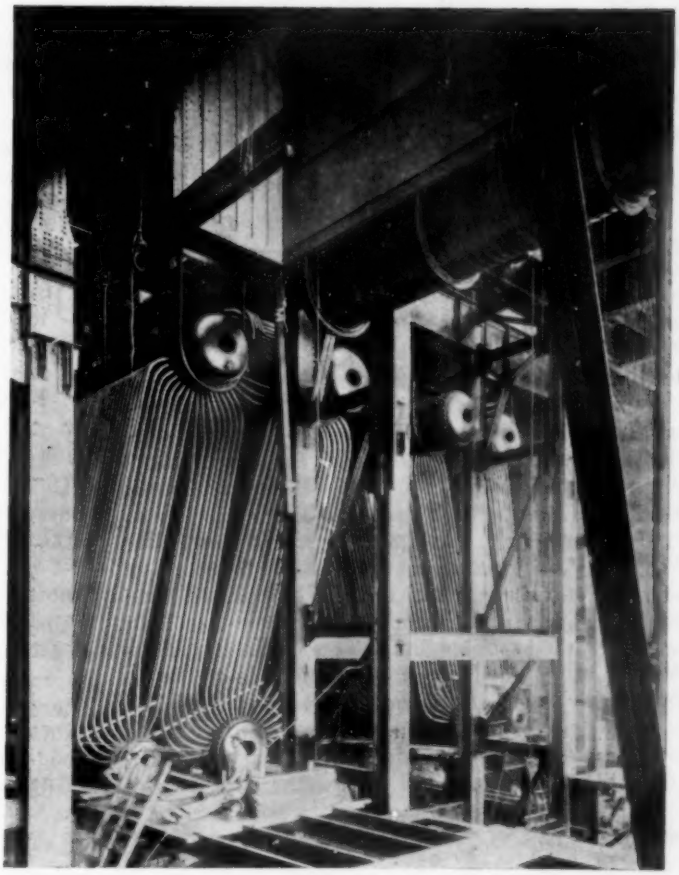
MAR 19 1930
PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a year 15c a copy March 15, 1930



COLOSSUS OF STEAM

New York Feeds on Its Power

(See page 162)

Vol. XVII No. 466

Punch Here to Fit Science News-Letter Binder Over

New Cancer Research Still Experiment

Medicine

Investigators Will Tell Senate Committee Results

DOCTORS W. B. Coffey and J. D. Humber of San Francisco, who are working experimentally upon cancer, have wired Senator Hiram Johnson that they will gladly appear before the Senate Commerce Committee to explain their work and coöperate with the subcommittee which is investigating possibilities of governmental aid for cancer research. The telegram reads:

"We deeply appreciate your invitation to appear before your committee which is considering the resolution of Senator Harris and we will gladly do so with the object of lending our best efforts in coöperating with your committee in accomplishing its commendable aims. The increased demands upon our time in administering to the care of the many patients who are seeking our aid and the work involved in devising a practicable means whereby we may insure early and efficient coöperation of institutions and others qualified by ability and experience to conduct research work, will prevent us from at once attending upon your committee. However, either one or both of us will make an effort to appear at the earliest possible date and we will inform you promptly and at an early date when we are able to appear. At that time we will inquire whether the day suggested will meet the convenience of your committee."

For the second time within a month, the Journal of the American Medical Association has warned physicians and the public not to place undue faith in new methods of treating cancer by glandular extracts, such as that recently announced by Drs. Coffey and Humber.

Drs. Coffey and Humber themselves have insisted that their work is still in the experimental stage.

"We do not claim to treat or cure cancer," they stated in a telegram to the American Medical Association.

Dr. Boris Sokoloff, who has developed a method which uses a combination of extract from the cortex of the suprarenal glands and iron salt, has confined himself to laboratory investigations so far.

"My personal activity was and is limited strictly to experimental investigation carried out in the laboratory and so far I have not treated patients and do not intend to do so in the future," Dr. Sokoloff has reported to the American Medical Association.

Two other investigators have reported to the American Medical Association experiments with methods of treating cancer. Dr. C. F. Charlton of Pasadena, Calif., has found a way to destroy cancer cells with administration of extract from the omentum, a membrane which goes from the stomach to adjacent organs. Dr. Adolph M. Hanson of Faribault, Minn., announced similar results using an extract from the thymus gland. Many other manuscripts describing the use of glandular extracts or tissues in the treatment of cancer have been received by the American Medical Association since the Coffey-Humber method has been made public.

Without criticizing the work of any of these investigators, the editors of the association's journal point out that "modern discoveries are the results of the accumulation of investigations over a series of years pointing toward a definite end." But until that end has been reached and the success of the newly-discovered method established beyond doubt, the public should not seek immediate practical applications of the method.

"When thousands of sufferers from cancer are led to false hopes, when husbands mortgage homes in order to carry wives with incurable cancer across the continent for experimentation with unestablished methods, the Journal must continue to caution physicians and the public," the editorial concludes.

Science News-Letter, March 15, 1930

The Answer Is

In This Issue

Largest Boiler

ONE of the three largest boilers in the world is shown on the front cover. They were recently installed in the East River station of the New York Edison Company to run the largest single-unit electric generator in the world.

If this 215,000 horse-power turbogenerator had been developed in 1906, it could have supplied all current used for lighting in the United States.

The picture, taken before the boiler was bricked in, shows a part of the 23 miles of tubing each contains. There are 3,786 separate tubes and 10 drums. The boilers are as tall as an eight story building. With their auxiliaries, the three cost $5,500,000.

A thousand tons of coal are required each day to operate one at full capacity. A unit in a recent test changed 156,250 gallons of water per hour into steam at 425 pounds pressure and 750 degrees Fahrenheit.

Engineering

Science News-Letter, March 15, 1930

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

In requesting change of address, please give old as well as new address.

Advertising rates furnished on application.

Copyright, 1930, by Science Service, Inc. Republication of any portion of the SCIENCE NEWS-LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service, details and samples of which will gladly be sent on request.

Earth May Have Comet-Like Tail

Astronomy

STREAMING out from the earth on the side away from the sun there may be a sort of comet-like tail, which we sometimes see as a faint patch of light called the "Gegenschein" or "counter-glow." This is the suggestion just made by Dr. E. O. Hulburt, of the Naval Research Laboratory, in a report to the American Physical Society on the nature of the zodiacal light.

This light can usually be seen on a dark, clear night after twilight has gone. It appears as a faint beam of light extending upward from the western horizon along the ecliptic, the path of the planets. In the spring, when the ecliptic is almost vertical in the evening, it can best be observed. Near the horizon it is brighter than the Milky Way. In the early morning, before dawn, it can also be seen, extending upwards in the eastern sky. The generally accepted theory of its origin, in recent years, has been that it is caused by sunlight reflected from a mass of tiny bodies, each moving in its own orbit around the sun. The "Gegenschein," seen in a dark night sky as a faint patch of light directly opposite the sun, was supposed to be due to a concentration of these small particles about a million miles from the earth on a line with the sun and the earth, as a result of the gravitational attraction of these two bodies.

Dr. Hulburt, however, revives an old theory, that the particles originate in the earth's own atmosphere. He points out that outbursts on the sun, which give rise to magnetic storms and displays of the northern lights, also affect the zodiacal light. On this account, he suggests, it seems as if the zodiacal light is not mere reflected sunlight, but that the particles themselves first absorb the light, and then re-emit it. Physically, this is quite a different process from reflection.

Dr. E. O. Hulburt of the U. S. Naval Research Laboratory

According to Dr. Hulburt, collisions of atoms and molecules high in the earth's atmosphere cause some to be ejected from the influence of the earth with a speed of about seven miles a second. They reach levels of some 40,000 miles above the surface of the earth where they are partly broken into ions by the action of the sun's ultra-violet light. Here they are acted upon by three forces: the gravitational attraction of the earth, the magnetic attraction of the earth and the pressure of light from the sun. This arranges them into a ring, oblong in cross-section, surrounding the earth. It is this ring that gives off the zodiacal light, suggests the physicist.

"The ring is perhaps 50,000 kilometers (31,000 miles) distant on the daylight side of the earth," he said. "On the night side the ring stretches out to great distances of 100,000 or 1,000,000 kilometers (62,000 or 620,000 miles). At its far end ions continually stream away in the direction of the sun's rays, so that the ring merges into a sort of comet's tail which may be the Gegenschein."

At the rate at which the atoms would escape from the earth, Dr. Hulburt estimates that about a millionth of the atmosphere would be ejected in a million years.

One point which his theory does not explain, he admits, is that about 15 per cent. of the zodiacal light is polarized, that is, the light vibrations are only in certain particular directions, instead of being indiscriminately in all directions, as in ordinary sunlight.

Fellowships Awarded

General Science

TWENTY-FOUR new National Research Council fellowships, together with ten renewals of fellowships previously granted, were granted to young American scientists at a recent meeting of the officers of the Council. These fellowships are among the most prized of all scientific awards open to the younger generation of scientists, not only because of the prestige they carry but because they confer cash as well. The sum granted to any individual is not fixed, but is adapted to his needs, and is supposed to enable him to conduct research for one year without depleting his own funds or compelling him to resort to routine jobs to support himself.

Four of the newly appointed fellows expect to carry on their advance work in foreign lands. They are F. R. Immer, W. M. Krogman, C. H. McConnell and L. T. Steiger. The remaining twenty will study at universities and research institutions in this country. They are O. D. Anderson, George S. Avery, Jr., G. W. Beadle, Harold W. Beams, Alden S. Crafts, L. W. Gellermann, F. L. Howard, W. E. Lammerts, R. K. Meyer, Dorothy K. Postle, Daniel Raffel, Hugh M. Raup, T. C. Schneirla, Eleanor H. Slifer, C. V. Smythe, Olive G. Stull, J. H. Tiffin, T. Elliott Weier, Gene Weltfish and John S. Yerakis.

The reappointed fellows are Frederick Bernheim, Carleton S. Soon, Eileen W. Erlanson, G. LaVerne Freeman, Anna H. Gayton, D. A. Johansen, T. J. B. Stier, Donald Keith Adams, Paul R. Gast and Dietrich C. Smith.

The appointments at the recent meeting were all made in the field of biology, psychology and anthropology. Other awards are made in medicine, physics and chemistry. A further group of appointments in biology will be made about May 1. Applications for these should be in the hands of the committee by April 1.

Felix Plater, a Swiss physician, who, in 1614, recorded the death of an infant by suffocation from an enlarged thymus gland, an early case of thymic death.

Glands of Mystery—Who Knows the Use of Pineal and Thymus?

Endocrinology

By Jane Stafford

THIS is a mystery story. It is about mysteries that modern science, for all its wonder-working, has not yet unravelled, secrets that the body still keeps more or less inviolate.

Inside your body you have two organs that baffle scientists and refuse to reveal their purpose to the modern investigator, just as they mystified the ancients who studied the human body and tried to learn its secrets thousands of years ago.

The pineal gland, a pea-sized structure near the base of your brain, was once considered the seat of the soul; the thymus, a large gland located high in your chest that has been thought to shrink as you grew older, and which was once considered "the center of courage and affection;" these two have guarded their secrets closely. What they may do to stimulate or retard body processes, how they affect your growth and development, cannot now be told exactly.

Disease or disorder of each of these glands has grave results, often fatal ones. Yet the real functions of these two glands are not definitely known. Scientists are not agreed on why we have them or what they do for us. They probably are not essential to life itself, but even this has not been definitely proved.

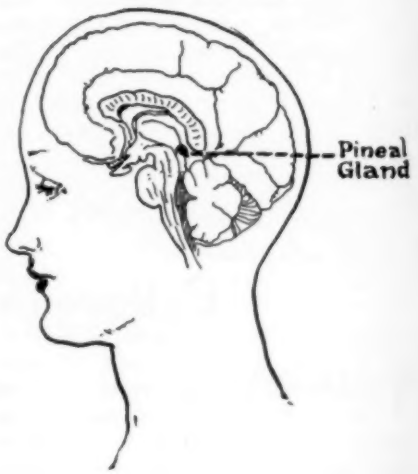
Do they, like the other endocrine glands, secrete a powerful hormone that controls some of the body's processes? Scientists are not sure. No such hormone has ever been discovered for either of these two glands. Experiments with glandular extracts have not proved anything conclusively.

An apparently healthy baby was found dead in its crib. No previous sign of any illness had existed. No cry, no struggle had warned the frantic parents. Death had struck silently and suddenly. A post-mortem examination revealed that the child's thymus gland had become enlarged to such an extent that it had pressed on the baby's windpipe and so cut off the baby's supply of air. The infant actually had been strangled to death, as surely as though his little throat had been crushed by cord or fingers.

Occasionally a child dies while under an anesthetic given for some operation, such as removal of tonsils or correction of some defect. The same amount and kind of anesthetic may have been given, in just the same way, to hundreds of other children with no untoward results. But this unfortunate child had a large thymus which had perhaps already been making it difficult for the child to breathe, and the added strain made by the anesthetic, was more than could be tolerated by the body.

This danger of strangulation or suffocation by an enlarged thymus is particularly grave in infants and small children, for the thymus is a large organ at birth, and grows smaller as the individual approaches maturity. At one time it was thought that the thymus disappeared completely by the time a man was fully grown. For this reason it was supposed to have some connection with growth. This theory had a distinct set-back by some observations made on healthy people who died of violence and not disease. Examination of some German soldiers showed that they all had large, well-developed thymus glands.

Showing the location of the pineal gland, a tiny, cone-shaped structure in the brain, which once was called the seat of the soul.



A more modern theory about the thymus credits this gland with power to protect us against disease, or to help our bodies fight disease germs and overcome them. This theory is based on the fact that the thymus contains a great many lymphocytic cells. These are the cells that fight the disease germs which get into the body. The lymphocytes rush to the site of an infection, surround the invading germs, and do their best to overcome them. Sometimes they succeed, but at other

times they do not. In the latter case the body cannot manufacture lymphocytes fast enough to keep up with the ever-increasing numbers of disease organisms. The thymus may be considered a sort of storehouse for lymphocytes, and it may even be concerned in their production. If this is true, it is very apparent that the thymus may be a powerful weapon in man's fight against the ubiquitous germ.

"The thymus functions as a lymphoid organ in infancy and childhood when a large number of lymphoid cells and leucocytes are needed to combat infection," Dr. E. R. Hoskins has written.

But even this is only theory, and beyond the fact that the thymus contains large numbers of lymphocytes, we do not possess certain knowledge that the thymus does act to protect us from disease.

One of the earliest scientists to record observations on the mysterious thymus gland was Felix Plater. In 1614 he made a post-mortem examination of a five months' infant who had died suddenly and mysteriously, apparently from suffocation. Plater discovered that the child had a greatly enlarged thymus gland. To this condition he attributed the child's sudden and otherwise inexplicable death. His observation was the first of its kind and is all the more remarkable because of the prejudices then existing which made post-mortem examinations extremely difficult to perform.

If the thymus can cause such tragedies, we have, fortunately, in the X-ray and radium a means of preventing them, in the opinion of a number of modern physicians and surgeons. X-ray pictures show the outlines of the thymus gland where it lies just above the heart in the chest cavity. If these pictures show the gland to be enlarged, radium treatment will reduce it to a safe size.

In this way, X-rays and radium are daily saving the lives of many babies who have enlarged thymus glands, according to a report made to the Radiological Society of North America by Dr. Howard P. Doub of the Henry Ford Hospital, in Detroit, and Dr. H. B. Podlasky of Milwaukee.

"When a baby strangles or becomes blue or has a hoarseness or a cough, it may have an enlarged thymus," they said. "The thymus gland may become a dangerous organ and cause abnormality or death due to asphyxiation if it develops into an abnormally large thymus. This is especially dangerous to children and frequently causes death. It may also cause a fatality during operative treatment while the child is under anesthesia. The gland, however, may be reduced and made harmless by the use of X-ray and radium treatment."

A number of physicians are now making it a practice to have X-ray pictures taken of the chests of all babies under their care. If an enlarged thymus is discovered, a course of treatment is then instituted. Surgeons also are taking the precaution of discovering, if possible, whether a child has an enlarged thymus, before they undertake an operation on the child.

Other scientists, however, do not feel that X-ray treatments of thymus glands are always justified. In the first place, it may even be natural for the child to have an enlarged thymus, for the normal size of this gland cannot be stated definitely yet. Then, the enlargement of the thymus may be the result of other conditions, and in such a case may be harmless and may be reduced spontaneously when the other conditions are relieved. For example, climatic conditions may possibly affect the size of the gland, Dr. Douglas D. Martin of Tampa, Florida, observed at a recent meeting of the Southern Surgical Association. The enlargement of the thymus may also be the result of conditions such as respiratory infections and not of glandular disease itself.

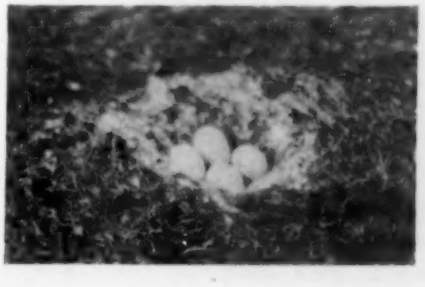
Infants and small children are not the only ones who may suffer from disorder of the thymus glands. Some people are born with a definite inherited type of disease which is known by the long name of *status thymicolymphaticus*. At birth such persons have enlarged thymus glands. As a rule their skin is extremely fine and smooth and they have beautiful pink complexions. They are apt to have attacks of cyanosis in which the skin turns blue. Sometimes the cyanosis is so severe as to cause unconsciousness, convulsions and not infrequently sudden death. Some persons who have a particularly large thymus are apt to have attacks of what is known as thymic asthma. They have sensations of pressure in the middle of the chest, probably due to an enlarged thymus gland. Prompt treatment with X-ray may relieve this condition.

Until recently, the condition known as status thymicolymphaticus was not recognized until after death, when post-mortem examination showed the condition of the thymus that had caused death. The condition was generally connected with quick and sudden death. However, better methods of diagnosis, including the X-ray, have now shown that most of the people suffering from this condition do not die, because certain changes take place in the body by which other organs compensate for the abnormal condition of the thymus, according to the theory of Dr. Walter Timme, eminent neurologist who has investigated the subject.

Children who have this condition mature very slowly, Dr. Timme has observed. These children and also the adults suffering from the condition, have low blood pressure and flabby muscles. They tire easily and have but slight resistance to infections.

"In behavior they remain children. They follow the path of least resistance, shirk responsibility, and lack the ability to concentrate. Consequently they are apt to feel inadequate and inferior," Dr. Timme wrote in a description of this type of individual.

Dr. Timme thinks the body automatically at- (*Turn to page* 174)



A blue goose and her eggs. Perhaps the goose that laid the golden eggs had a superfine thymus gland, since a diseased or missing thymus causes birds to lay imperfectly formed eggs.

Prohibition-Shock Seen as Neurosis

Psychiatry

"Don't" Attitude Prevents Sane and Temperate Living

By Dr. Stewart Paton

Dr. Paton's recent testimony before a congressional committee on the problem of prohibition presented the interesting viewpoint of a psychiatrist. Although not everyone will agree with his reasoning and conclusions, his thesis is considered worth presentation, as that of a man who sees social problems with eyes accustomed to watching the effects of self-imposed prohibitions on the individual. Recognized as a leader in his field of research, Dr. Paton is lecturer in psychiatry of Johns Hopkins University and is a trustee of the Carnegie Institution of Washington.

EVERY human being is a remarkable combination of sane, insane and criminal tendencies. One of the most important questions that confronts the American people today is:

What shall we do to take a constructive interest in stimulating sane impulses, and in diverting energy that might be expended in intemperate, insane and criminal tendencies into constructive and creative channels?

It is a very difficult problem that we have before us to try to answer these questions about how to handle the human machine so that it may be used for constructive purposes. These problems are very important. We are trying to regulate the activities of such a complicated and delicately balanced machine that we should try to secure good advice on the subject and secure assistance from people whose business it is to study the activities of human beings.

When the Government needs advice about the establishment and maintenance of power plants it asks the opinion of experts who have had experience in building and operating power plants. I am sure that no reasonable person has any objection to offer about the Government's method of procedure when it asks for advice from experts about plans for using the water power of the country to generate electricity.

Unfortunately when the Government decided to take an active part in directing the streams of human energy so that these should be used for temperate, sane and constructive purposes it did not ask the experts who are accustomed to study the flow of instincts and emotions that drive the human machine. It asked the opinion of people who are successful in manufacturing automobiles, in developing industrial organizations, in organizing and running railroads, banks and various commercial enterprises.

This decision not to ask the advice of people whose business it was to know something about the complicated human machine has resulted in such a serious mistake that the resulting conditions have become a serious menace to "government of the people, by the people, for the people."

The Eighteenth Amendment to the Constitution is a serious menace to temperance and sanity. This amendment to the Constitution expresses the emotional and mental attitude toward life and its problems that is characteristic not of the people whom we recognize as temperate and sane but of the unfortunates popularly described as insane and criminal.

One of the chief characteristics of people we call insane and criminal is that they think of life largely in terms of prohibitions.

One of the distinguishing features of a sane person is that he has a reasonable amount of confidence in his ability to follow a sane, constructive course of action whenever he is confronted by a difficult or embarrassing situation. When the insane or criminal is confronted by a difficult situation he begins to think of the things that he should not or must not do. The attention is focussed largely on the prohibiting complex, and the result is that the drive of the impulse to do what is insane or criminal is intensified. The hysterical interest taken in the subject of getting rid of alcohol as a beverage has had the effect of increasing the intensity and duration of the desire of a great many Americans to drink. It has changed temperate into intemperate desires to drink. If a special amendment had been added to the Constitution forbidding people to be fanatical or to steal, it would have stimulated even a greater interest in fanaticism and in stealing than is exhibited today.

Fortunately the people in the country who are entrusted with the education of young people have not adopted the same attitude toward their pupils that the American Government has adopted toward its citizens. The Government has told the world that it has not any confidence in the ability of the American citizen to lead a sane and temperate life. If the school teachers of the country exhibited a similar degree of distrust in their pupils' ability and wish to be temperate and sane the results would be disastrous. The two great tragedies of the present century have been, first the World War, and second, the confession of the American Government that the citizens of this country are predisposed to be intemperate, insane and criminal. Autocratic Prussia, Soviet Russia and so-called Democratic America have put their faith in prohibitions and in armed intervention to force people to obey and have respect for unreasonable laws.

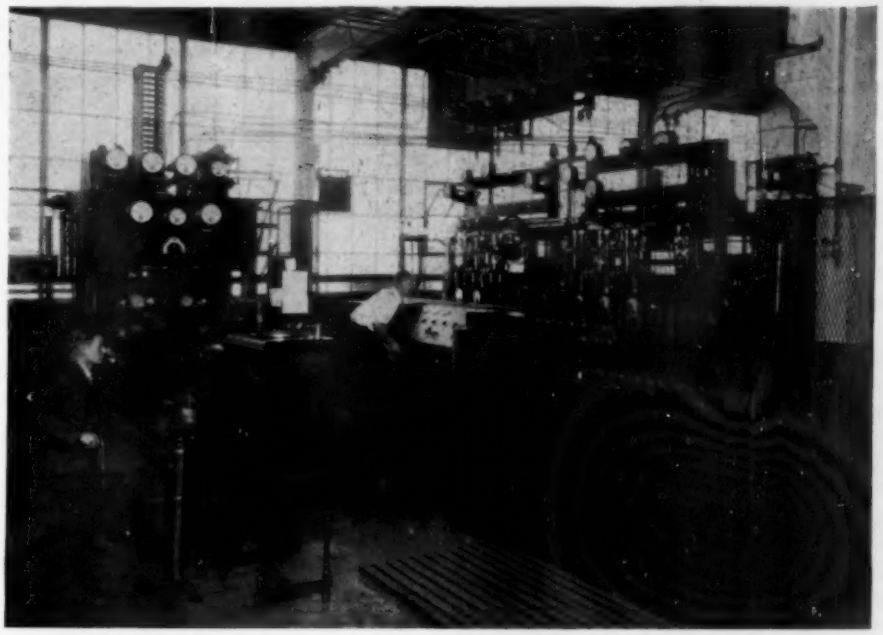
One of the most deplorable results of prohibition is that it has diverted our attention from the study of the underlying causes of intemperance, insanity and criminality. In the fanatical attempts that have been made to enforce prohibition, the worm temperance has almost been forgotten. The prohibitive attitude of mind has closed our eyes to the fact that intemperance and insanity in many cases are the result of our unpreparedness as a people to enjoy leisure and upon our frantic breakneck efforts to violate the speed laws that should govern the rate at which the human machine is driven.

After the War this country had a marvelous opportunity to show the world how to live temperately and sanely. Instead of doing this it decided to embark on an intemperate and insane campaign to misdirect human energy. If the Government had been intelligently interested in directing human activities it would have recognized immediately how little we really know about this extraordinarily complex and delicately balanced human machine. Then if the campaign to direct human energy had been wisely planned efforts would have been made at once to remedy this condition. Experts would probably have been sent to Europe to study what has been accomplished there to give us more information about what is being done to get some clearer notions than we have today about the strange complex of sane, insane and criminal tendencies that we call human nature. In Berlin and Munich as well as in other foreign cities institutes have been established for the express purpose of encouraging investigators to study human beings.

In 1798 in France the great French physician, Doctor Pinel, ordered the chains to be re- (*Turn to page* 172)

New Radio Station Has Highest Power

Radio



Here is the heart of the 200 kilowatt broadcast transmitter at WGY. At the left is the intermediate power amplifier and to the right is the main power amplifier. Just in front of the operator leaning over the switchboard can be seen the six 100 kw. tubes that make this station possible.

BROADCASTING with 200 kilowatts of power, four times as great as the highest powered regularly licensed station, was successfully accomplished by Station WGY of the General Electric Company, Schenectady, N. Y., on Sunday, March 9. Using a special experimental license, with the call letters W2XAG, the highest power ever used in broadcasting was put on the air at 4:00 a. m. eastern standard time. Experiments were continued for seven days at the same hour, which was chosen to prevent possible interference with other stations of the country.

Tests on 200 kilocycles have been reached by easy stages on progressively higher power. In July, 1925, WGY was the first station to work on 50 kilowatts and since that date many stations have been licensed by the Federal Radio authorities to use on their regular programs at all hours what was once regarded as super-power. In August, 1927, WGY advanced to the next stage—100 kilowatts. Early in January, this year, without any prior announcement and without informing listeners what power was being used, WGY, on its license W2XAG, broadcast a series of recorded programs on 150 kilowatts.

Now General Electric engineers have begun tests on 200 kilowatts. The transmitter is located on the 54 acre radio laboratory a few miles south of Schenectady where facilities are available for the power and cooling requirements of a large number of transmitters. There are, for example, four steel antenna towers, three 300 feet high, and one 150 feet high, and in addition a large number of small masts, between all of which are many different types of radiators or antennas. At the main power house one of six rectifiers is capable of supplying 750 kilowatts of direct current at 20,000 volts.

The design of apparatus capable of handling 200 kilowatts of power was preceded by years of exhaustive investigation and a slow progress from low to higher power. Probably the greatest single impetus to the art of high powered broadcasting was the development of the 100 kilowatt, water-cooled power radiotron in the vacuum tube department of the General Electric Company's research laboratory. Instead of complicating design to produce high power through the medium of many 20 kilowatt water-cooled tubes, the design was simplified by the use of a few 100 kilowatt tubes. 100 kilowatts is a conservative rating for these power tubes which are actually capable of considerably greater outputs.

In the 200 kilowatt transmitter there are six 100 kilowatt power tubes. Each tube is five feet long or seven and a half feet when included with its water jacket.

Direct current supply for the 200 kw. power linear amplifier is obtained from a six-phase rectifier utilizing twelve phanotrons, which are air-cooled, hot-cathode, mercury-vapor rectifier tubes. The power amplifier feeds a radiator system consisting of a vertical cage antenna and radial counterprise. The antenna current corresponding to 200 kilowatts is 92 amperes.

The 200 kilowatt power amplifier is driven by a five kilowatt intermediate power amplifier very similar to the commercial five kilowatt broadcast transmitter and uses two 20 kilowatt water-cooled tubes in a push-pull circuit.

The frequency of the transmitter is controlled by a 790 kilocycle piezo-electric quartz crystal maintained at constant temperature. The deviation from 790 kilocycles is never more than a few cycles, as checked by the General Electric general engineering laboratory's primary standards. The overall fidelity of tone of the transmitter is unequalled. A recent measurement of the overall frequency characteristic shows a departure from ideal transmission of only two per cent at frequencies corresponding to the lowest notes produced by any musical instrument, and but slightly greater reduction at 10,000 cycles. The transmitter is thus able to reproduce faithfully the overtones of any musical instrument. In the 200 kilowatt transmitter the identity of musical instruments is well preserved because the higher harmonies which color the tone of each instrument are not lost on the way through the various stages of the transmitter.

In order to keep the giant tubes of the transmitter properly cooled, it is necessary to circulate 15 gallons of water per minute through the water jacket surrounding the anode of each tube. For the transmitter proper a flow of 100 gallons per minute is required. This is obtained from a cistern with approximately 20,000 gallons capacity.

Measuring by Light

Methods by which diameters of stars have been measured have been applied to the measurement of terrestrial distances with very high precision by Stuart H. Chamberlain, at the Michigan State College, East Lansing, Mich. In a report to the American Physical Society, he describes the method which makes use of the interference of light waves.

When a beam of light is separated into two parts and recombined under the proper conditions, a series of light and dark bands result, called interference fringes. Variation of as much as a small fraction of a wave length of light in the distance traveled by one of the parts causes a perceptible shift in the bands.

In the instrument developed by Mr. Chamberlain, a parallel beam of light is divided into two parts which, slightly separated, converge towards a mirror at the distance to be measured. This reflects them back to the observer, where they are combined by a prism and the fringes are seen in a telescope. Counts of the numbers of the dark bands tell the distance between the light source and the mirror.

Physics

Science News-Letter, March 15, 1930

Mine Rescue

One mine rescue station has already been established and two others will be created in the chief mining districts of Ontario following legislative action, D. G. Sinclair, chief inspector of mines for Ontario, told the Canadian Institute of Mining and Metallurgy at its annual meeting.

These stations come as the result of governmental investigation of the Hollinger mine fire in 1928, which took 39 lives.

Experts now teach miners modern rescue methods in the rescue station already established at Timmins. It also contains apparatus for fighting underground fires, including self-contained oxygen-breathing apparatus, gas masks, an inhalator, oxygen and carbon monoxide detectors, etc.

Safety

Science News-Letter, March 15, 1930

Free Entry

Special European manufactured scientific instruments, the like of which are not made in this country, will probably be available to schools and colleges without payment of duty after the passage of the new tariff bill.

An amendment offered by Senator Robert M. LaFollette of Wisconsin to the free schedule was accepted by the Senate and no difficulty is seen for its final acceptance by both Houses.

The LaFollette amendment provides for free entry to this country of "scientific instruments, apparatus, and devices of a kind not offered for sale in the United States by domestic producers, and imported for research purposes by any college or university, and not for sale." A further requirement of the amendment provides for such free entry under rules and regulations to be prescribed by the Treasury Department.

Senator LaFollette stated that the amendment as originally introduced and printed provided that any instrument imported for research or scientific purposes by a college or university should come in duty free. American manufacturers objected to that, and their contentions were upheld by many Senators, the consensus being that where good instruments of American manufacture can meet the needs of research work in this country, these should have the advantage which a tariff gives.

Senator Reed Smoot of Utah, chairman of the Senate Finance Committee, and in charge of the tariff bill in the Senate, explained the abuses to which free importation of scientific equipment for colleges were put after passage of the 1913 tariff act.

He said that colleges would import in quantity and sell to students or others. Half of the scientific instrument importations of the United States came in duty free after 1913, he declared.

He believes that the LaFollette amendment will obviate any such difficulty as that, particularly if the Treasury Department is able to outline good rules and regulations for administration of the provision.

Tariff

Science News-Letter, March 15, 1930

Rome on the Rhine

A complete picture of how Roman life was lived on the borders of Germany twenty centuries ago has been obtained as the result of excavations conducted by the Wallraf-Richartz Museum of Cologne, under the leadership of Dr. F. Fremersdorf. Although many hundreds of Roman villas have been discovered and partly excavated in Germany and France, the one explored by the Cologne institution is the first that has ever been worked over completely.

The original structure, which is for convenience called the "manor house," has a front of about 150 feet, and contains some 30 rooms. Its interior

IN VARIOUS CI

was partly sheathed with marble and partly in fresco. Literally thousands of broken pieces of these decorations have been brought to light.

Around this manor house there lay in a half-circle, fronting towards the east, eleven farm buildings of various kinds. All these remains have been investigated thoroughly, and the use of each one is now known. The museum workers have also discovered the deep spring that supplied water for this large farmstead, and dug it out to a depth of about 70 feet.

To the west, in front of the manor house, lay a large park, and the whole establishment was surrounded by a wall. In front of this wall, at the east, was a graveyard, in which during the first and second Christian centuries the cremated remains of the dead were laid away. More that fifty graves have been opened and investigated.

In addition to these there were a series of burials of late Roman time, in heavy stone sarcophagi. These yielded a series of remarkable funeral gifts of iron, bronze, silver, glass and pottery. Especially noteworthy are a series of bronze vessels which are regarded as the prototypes of the Frankist types of post-Roman times. Among the glass finds the most striking is a dish about six inches in diameter, made of clear glass. This has a lively picture of a rabbit hunt engraved upon it. It was taken out of the tomb completely undamaged.

In the midst of these funeral gifts there were two large silver spoons bearing the Christian inscription *Deo gratias*—"Thanks be to God." These cast a sharp light upon the transition from paganism to Christianity at the end of antiquity.

Archaeology

Science News-Letter, March 15, 1930

Prison Riots

Strict laws of the Baumes type, meting out life sentences to fourth offenders regardless of the severity of the crime committed, are held responsible for the recent prison riots in a statement just issued by the National Committee for Mental Hygiene.

The resort to such severe measures as a weapon against the crime wave is compared, in the report, to the futility of fighting yellow fever by devising an ideal sort of rifle and setting out to shoot mosquitoes.

"Through such laws," the statement continues, "society strikes blindly at

S CIENCE FIELDS

the crime problem, with little more intelligence than that of the 'lifer' making his desperate attempt to escape, and with the same futility so far as the gaining of ends is concerned. . . .

"Psychiatrists have long advocated the procedure involved in the true indeterminate sentence whereby an habitual offender may be detained in prison, correctional institution or hospital, for an indefinite period of time pending determination, after careful study and treatment, as to his capacity for readjustment to a law-abiding community life. The adoption of this principle along constitutional lines would achieve the aim of the Baumes law, though with a more discriminating justice, and at the same time would leave the way open for true reformational work with those capable of profiting by it."

Criminology
Science News-Letter, March 15, 1930

6-Foot Nest

When the storks of the village of Grünewalde fly north from Africa this spring they will find their old home on the schoolhouse, but they will hardly know the place. For the schoolhouse had to be reconditioned during the winter, and the nest had to be taken down. This incidentally gave naturalists a chance to examine a storks' nest of championship proportions, before putting it back on the roof.

The nest was over six feet in diameter and not much less than three feet high, larger by half than an ordinary storks' nest. It could contain four men sitting on chairs around a table. Sticks as thick as an arm had been built into its walls, and the interstices filled with moss, straw, hay and reeds. In odds and ends of space not needed by the storks upwards of 50 sparrow families lived.

Ornithology
Science News-Letter, March 15, 1930

May Erupt

Mt. Shasta, in California, and many of the other supposedly "extinct" volcanoes in the northwestern United States "might erupt at any time," stated Dr. T. A. Jaggar, director of the Hawaiian Volcano Observatory. He made this statement to controvert what he called the "Lassen myth" that Mt. Lassen, also in northern California, is the only active volcano in the continental United States.

"Geologists have long known that the volcanoes of the northwest are potentially active," he said. "Tradition has it that Mount Saint Helen's and Mount Baker have both had eruptions in historic times. The Cinder Cone east of Lassen was well known to the Indians and to geologists as the maker of a modern lava flow within a century. Eighten volcanoes lie along the Cascade fault in Oregon, and many more extend north through Washington into British Columbia. At Geyserville just north of San Francisco there is rushing volcanic steam under high pressure. This was in the epicentral belt of the San Francisco earthquake."

The fact that there is no record of eruptions of such volcanoes as Mt. Shasta is no proof that they are extinct, said Dr. Jaggar.

"Intervals between outbreaks are long in continental volcanoes of this class," he declared, "and the white man's history is short."

Volcanology
Science News-Letter, March 15, 1930

Prehistoric Murder

A prehistoric American murder mystery has been unearthed near the Great House, Casa Grande National Monument, by members of the Van Bergen-Los Angeles Field Party, engaged in excavating an ancient Indian village.

The skeleton of an adult, apparently a young woman, was found lying in the center of the room, surrounded by shattered water-jars and cooking pots and bowls. All about were charred roof timbers, and carbonized carrizo stems, remnants of the material used for thatching the roof and sides of the house. The position of the skeleton clearly indicated violent death. Beside it lay the blade of a hoe made of slate.

In a corner of the room were an assortment of bones representing the lower limbs of another individual. Most of these bones were charred by fire. Body and head were missing.

Archaeologists who viewed the room concluded that hostile Indians swooped down on the isolated little house, slaughtered the unfortunate inmates and set fire to the thatch, leaving the bodies to burn with the house. After the ruins cooled, coyotes probably dug through the mass of earth which had been the roof covering and made a meal off the former owners of the place. The appearance of the pottery in the house indicates to experts that the alleged killing took place about the ninth century A. D.

Archaeology
Science News-Letter, March 15, 1930

Manhood?

Boys beating each other with sticks until pieces of skin came loose, yet grinning and pretending to like it, were among the weird sights seen in the heart of Africa by W. D. Hambly, leader of the Frederick H. Rawson-Field Museum ethnological expedition which has just returned from a ten-thousand-mile trek through hitherto unexplored or little-known parts of the continent.

The tribe whose flagellation ceremony Mr. Hambly witnessed carries out this terrible rite only once a year, and then in disobedience to government orders. Each boy has to submit to a severe beating with a thick, supple stick wielded by a lad of his own age, to prove his manhood. The beating continues until strips of skin are torn off. The dazed victim is expected to smile and begin dancing. Later, he gets an opportunity to give another boy a similar thrashing. Crowds of girls attend this ceremony, for it is one of the preliminaries in the selection of a wife.

Some of the other tribes visited by Mr. Hambly are extremely primitive, wearing not a vestige of clothing. Murder and cannibalism are commonplaces of their lives. Self-mutilation and sacrification, either for religious purposes or to promote "beauty", he found to be widespread.

The expedition yielded rich returns in objects of all kinds used by the tribes in their religious rites, their warfare and their daily lives. Over 2,000 specimens were collected. There are also many motion pictures and still photographs showing native life, together with dictaphone records of the music and languages of some of the tribes.

Among the bodyguard of one tribal ruler Mr. Hambly found a man wearing a suit of chain mail, said to be a relic from the times when disbanded crusaders straggled from Palestine into North Africa.

Ethnology
Science News-Letter, March 15, 1930

Limestone in Bearings

Just as crushed rock is mixed into concrete, so small pieces of limestone are added to molten bearing metal to form a conglomerate which is in successful use in tramcars in Germany.

The theory of this revolutionary procedure is that the limestone acts as a sponge and absorbs the oil.

Engineering
Science News-Letter, March 15, 1930

Occupational Diseases in 18th Century —A Classic of Science

Medicine

A TREATISE OF THE DISEASES OF TRADESMEN, showing the various influence of particular trades upon the state of health; with the best methods to avoid or correct it, and useful hints proper to be minded in regulating the cure of all diseases incident to tradesmen. Written in Latin by Bern. Ramazzini, and now done in English. London, printed for A. Bell, 1705.

Of the Diseases of Glass-makers and Glass-grinders.

IN the whole Train of Tradesmen, I do not think there's any that manage their Business more wisely than those concern'd in the Glass-works. For they work only 6 Months of the Year, *that is*, in Winter and Spring, and the Rest of the Year they injoy themselves: And when they arrive at the fourtieth Year of their Age, they seasonably bid adieu to their Art, and spend the rest of their time either in injoying the easy Fruits of their former Labours, or in following some other Work. The hard laborious Work that these Men do, and which can't be bore but by Men of a robust Constitution, and that in the Vigour of their Age, is downright unsufferable for a long tract of Time. Indeed I take the melted Mass that floats in their Fornaces to be inoffensive, at least I know no sensible Harm it do's to the Workmen, for they never complain of that, neither is there any noysome Smell to be perceiv'd in the Glass-houses. The Nature of this Design does not allow me time to inquire particularly into the Nature of that Mass of which the Glass is made, or into the Mechanick Contrivance which forms the Glasses, by the intervention of Wind or Blowing. 'Tis sufficient to our present Purpose if we know that all the injury redounding to the Workmen from this sort of Work, is intirely owing to the violence of the Fire and sometimes the addition of some Minerals calculated for coloring the Glasses. The Workmen are obliged to stand constantly half naked in the coldest Season of the Year just by Furnaces heated to the last Degree, and there to blow the Glasses with their Eyes constantly fix'd upon the Fire and the melted Glass: So that their Eyes sustain the first Shock, and accordingly we find they oftentimes bewail their Misfortune in voiding a sharp waterish Humour, and grow thin and little, their watery Nature and Substance being exhausted and consum'd by the overtearing Heat. The same Heat tortures 'em with a perpetual & an insatiable Thirst, so that they are forc'd to drink often. But they drink Wine more willingly, than Water, for whoever drinks Water upon a great Heat from what Cause soever, will find it much more nocive than Wine; as it appears from the many instances of those who have dy'd suddenly by drinking cold Water upon great Heats.

They are likewise subject to the Diseases of the Breast; for having nothing on but their Shirt, their Breast is always expos'd to the Air, and when their Work is over, they're obliged to go in their Shirts from the Work-house to colder Places: So that Nature, the strong and robust, can't long bear such violent and sudden Changes; but must needs sink under Pleurisies, Asthma's and Chronical Coughs.

But far greater Misfortunes attend those who make the color'd Glasses for bracelets and ordinary Women's Ornaments, and other uses; for they can't color the Crystal without using Borax calcin'd, and Antimony with some Gold; all which they reduce to an impalpable Powder and mix it with the Glass in order to make a Paste. Now, while this is a doing, tho they cover and turn away their Face, they can't avoid receiving the Noxious Exhalations at the Mouth; nay it oftentimes falls out that they fall down dead, or are suffocated, or in Progress of time are tortured with Ulcers in the Mouth, Gullet, and Windpipe, and at last dye consumptive with Ulcers in their Lungs; as 'tis manifest from the Dissection of their Corps. . . .

Of the Diseases of Painters.

PAINTERS are also usually subject to various Disorders, such as the Tremblings of the Joynts, a Cachexy, a Blackness of the Teeth, a discolour'd Complexion; Melancholy and loss of Smelling: For it seldom happens that the Painters who use to draw the Pictures of others handsomer and better Complexion'd than the Originals, are themselves either handsome or well Complexion'd. For my part I have always observ'd that all the Painters I know either in this or other Towns, are a'most always sickly; and if we consult the Histories of Painters, we'll find they were not long-liv'd; especially if we confine our view to such as made a distinguishing Figure. History informs us that *Raphael Urbinas*, a very famous Painter was snatch'd away in the very Flower of his Age; & *Balthasar Castilioneus* condol'd his untimely Death in a very pretty Poem. 'Tis true, the Diseases of this sort of men may be imputed to their sedentary Life, and the Melancholy that feeds upon 'em, while they retire from human Society and bend all their Thoughts upon their Phantastick Idaea's. But the principal Cause of their sicklyness is the Matter of the Colors that's always among their Hands, and under Nose; I mean the red Lead, Cinnabar, Ceruss, Varnish, Oil of Wallnuts, and Oil of Linseed, with which they temper their Colours, and several other Paints made of various Minerals. Hence 'tis that their Shops have such a nasty stinking Smell, which is chiefly owing to the Varnish and foresaid Oils, and is very offensive to the Head; and perhaps the loss of Smell usual among Painters flows from no other Cause. Besides, when the Painters are about their Work, they have nasty daub'd Cloaths upon 'em, so that they can't avoid taking in at Mouth & Nostrils the offensive Exhalations; which, by invading the Seat of the Animal Spirits, and accompanying the Spirits to the Blood, disturb the Oeconomy of the natural Functions, and give rise to the above-mention'd Disorders. All the World knows that Cinnabar is the offspring of Mercury, Ceruss is made of Lead, Verdigrise of Copper, and the Ultra-marine color of Silver; for the Metallick Colours are much more durable than those of a vegetable Extraction, and for that reason the Painters value 'em more: In fine, 'tis plain that a'most all the Ingredients of Colors are taken from the Mineral Family, upon which score they can't choose but do harm, and by Consequence Painters must be liable to the

same Distempers (tho not in so flaming a Degree) with the Workmen that work in Mettal.

Upon this Head *Fernelius* gives a pretty curious Account, of an *Anjou* Painter, that was siez'd at first with a Shaking and Trembling in his Fingers and Hands, and afterwards with Convulsions in the same Parts, which likewise affected the whole Arm. Sometime after, the same Symptoms appear'd in his Feet, and at last he was taken with such a grievous Pain in his Stomach and both the Hypochondria, that neither Glysters, Fomentations, Baths, nor any sort of Remedy gave him ease. The only relief he had in the violence of the Fits, was to have three or four Men leaning with all their Weight upon his Belly, the Compression of which lessen'd the Torment. In this miserable Condition he continued for three Years; and then dy'd Consumptive. Our Author says, the noted Physicians were strangely divided in their Opinions of the true and genuine Cause of such a dismal Disorder; and that not only before, but after the opening of the Corps, for there was nothing preternatural to be seen about the Viscera. In reading this History, I could not but admire the open and candid Confession of *Fernelius,* who pursuant to the Custom of truly great Men, (as Celsus has it) makes this free acknowledgement: *O m n e s siquidem aberamus à scopo, & tota quod ajunt via errabamus,* i.e. *All of us mistook the Case, and were quite out of the Way.* He adds further that this Painter having us'd not only to wipe his Pencil with his Fingers, but imprudently to suck it clean; 'tis likely that the Cinnabar thrown upon the Fingers, was communicated to the Brain and the whole Nervous System, by the meer continuity of the Parts; and that receiv'd at the Mouth in sucking the Pencil, tainted the Ventricle and Intestines with an inexplicable malignant Quality, that prov'd the occult Cause of the immense Pain.

The same is the Cause of their discolour'd Complexions, and Cachectick Habit of Body; as well as of the Melancholick Fits they are usually Subject to. 'Tis said of *Antonius de Allegris,* commonly call'd *Corrigiensis* from *Corregio* the Place of his Nativity, that he was so melancholy and even stupid, that he had no Sense of the Value and Excellency either of himself or his Pieces; insomuch that he return'd to his Admirers the rewards they sent him, as if they been mistaken in giving a great Price for those Pictures which are now above any Price whatsoever.

Upon the Whole, when Painters are siez'd either with the above-mention'd Disorders, or with other common Diseases, care must be taken that the common Remedies be blended with those particularly calculated for redressing the Disorders occasion'd by Minerals: Of which above.

Of the Diseases of Learned Men.

WE conclude our History of the Diseases of Artificers or Tradesmen with a short view of those of the Learned World; hoping that the Men of Letters will not take it ill to find themselves rank'd in the Class of

Self portrait of Raphael. Was this famous painter "snatched away in the very flower of his age" by the deadly metals whose salts he used as pigments?

Tradesmen; considering that as other Tradesmen gain by their Trades, so they purchase to themselves by the pursuit of Letters, if not great Estates like those of Merchants, at least a Livelihood and many comfortable Conveniences: For I see few in this Age at least, that would give themselves the Trouble of pursuing Learning, if they were not pinch'd with narrow Circumstances before they set about it. So true 'tis that Necessity is at once the Mother of Mechanick Arts and of Wisdom. Pursuant to which Maxim *Aristophanes* writes, That if Poverty and Riches were out of the World, all things would be overturn'd, and Philosophy with all other Arts would lie uncultivated for want of Votaries.

Generally speaking, the Ingenious sort of Men, if pinch'd with Poverty, and buoy'd up with the Hopes of getting Riches, apply themselves intirely to the Study of Letters; and by that Means procure to themselves not only a splendid Estate, but great Reputation among the Persons of Quality, who are then forc'd to knock at the Gates of the Learned to ask Advice. But after all, tho' the pursuit of Learning affords a plentiful Harvest of Riches and Glory, it seldom fails to produce Thistles and an ugly Crop of Evils: For your Learned Men, to use *Ficinus's* Words, are as Slothful and Idle in their Body, as they are Active and Busie in their Mind and Brain, and so almost all of 'em, excepting the Practitioners of Physick, undergo the Inconveniences of a sedentary Life. 'Tis a known Saying, That a Man grows Wise by sitting; and accordingly they sit Night and Day among the Trophies of Learning, and are not aware of the Inconveniences accruing to their Bodies, till the hidden Causes of Diseases have gradually crept in upon 'em, and confined them to their Beds. I have already shewn the Inconveniences of a Sedentary Life, and therefore shall not insist upon 'em now.

The Professors of Learning are likewise not unfrequently subject to the Inconveniences of a standing Life; for to avoid the Injury of a sedentary Life, that's so much cry'd down, many of 'em run to the contrary Extream, and stand turning over their Books for several Hours and even whole Days, which is not less, nay perhaps more hurtful than constant sitting.

All the Men of Learning use to complain of a Weakness in the Stomach. *Celsus* says, A great many of the Inhabitants of Cities and Towns, and almost all the Lovers of Learning, have weak Stomachs. There's no hard Student almost but what complains of his Stomach: For while the Brain is imploy'd in digesting, what the Itch of Knowledge and the Love of Learning throws in, the Stomach can't but make an imperfect Digestion of the Aliment, by reason that the Animal Spirits are diverted and taken up in the intellectual Service; or that these Spirits are not convey'd to the Stomach with a sufficient Current, upon the account of the strong Application of the Nervous Fibres and the whole Nervous Systeme in profound Study. How much the Influx of the Animal Spirits contributes to the due Performance of all the natural Functions of the *Viscera,* is manifest from the Decay of paralytick Parts; for tho' these Parts are sypply'd with vital Juice by the perpetual Afflux of the arterious Blood, yet they dwindle and decay by being depriv'd of that nervous Juice or Spirits or whatever it is, that is convey'd to 'em thro' the Nerves.

(*Turn to page* 175)

SCIENCE SERVICE RADIO TALKS

Every week a radio talk on science, prepared by Science Service, is given from each of the stations listed below at the times mentioned. Times are in standard time of the locality.

KFMX NORTHFIELD, MINN.; Carleton College; 1250 kc., 1000 watts. Monday, 11:00 to 11:15 a. m.

KFRU COLUMBIA, MO.; Stephens College; 630 kc., 500 watts. Tuesday, 5:00 to 5:15 p. m.

KGBU KETCHIKAN, ALASKA; Alaska Radio and Service Co.; 900 kc., 500 watts. Wednesday or Friday, 7:00 to 7:15 p. m.

KGU HONOLULU, T. H.; The Honolulu Advertiser; 940 kc., 1000 watts. Sunday, 4:45 to 5:00 p. m.

KOAC CORVALLIS, ORE.; Oregon State Agricultural College; 550 kc., 1000 watts. Thursday, 7:45 to 8:00 p. m.

KOIN PORTLAND, ORE.; New Heathman Hotel, 490 kc., 1000 watts. Sunday, 4:45 to 5:00 p. m.

KUOA FAYETTEVILLE, ARK.; Will S. Gregson; 1930 kc., 1000 watts. Monday, 8:30 to 8:45 p. m.

KVOO TULSA, OKLA.; Southwestern Sales Corporation; 1140 kc., 5000 watts. Monday, Tuesday or Thursday, between 12:45 p. m. and 1:30 p. m.

WCAD CANTON, N. Y.; St. Lawrence University; 1220 kc., 500 watts. Thursday, 12:30 to 12:45 p. m.

WCAJ LINCOLN, NEB.; Nebraska Wesleyan University; 590 kc., 500 watts. Saturday, 10:00 to 10:15 a. m.

WDAE TAMPA, FLA.; Tampa Daily News; 620 kc., 1000 watts. Irregular times.

WEAO COLUMBUS, O.; Ohio State University; 570 kc., 750 watts. Friday, 12:50 to 1:05 p. m.

WGBF EVANSVILLE, IND.; Evansville on the Air, Inc.; 630 kc., 500 watts. Sunday, 5:30 to 5:45 p. m.

WGR BUFFALO, N. Y.; Buffalo Broadcasting Corp.; 550 kc., 1000 watts. Thursday, 6:15 to 6:30 p. m.

WHAS LOUISVILLE, KY.; Courier-Journal and Louisville Times; 820 kc., 10,000 watts. Used for spot fills; not regularly scheduled.

WHAZ TROY, N. Y.; Rensselaer Polytechnic Institute; 1300 kc., 500 watts. Monday, between 9:00 and 11:00 p. m.

WHBY WEST DE PERE, WIS.; St. Norbert College; 1200 kc., 100 watts. Tuesday, 12:45 to 1:00 p. m.

WHO DES MOINES, IA.; Bankers Life Co.; 1000 kc., 5000 watts. Monday, 4:30 to 4:45 p. m.

WJBL DECATUR, ILL.; Commodore Broadcasting, Inc.; 1200 kc., 100 watts. Wednesday, 7:00 to 7:15 p. m.

WMAL WASHINGTON, D. C.; M. A. Leese Radio Co.; 630 kc., 250 watts. Thursday, 6:15 to 6:30 p. m.

WMAQ CHICAGO, ILL.; Chicago Daily News; 670 kc., 5000 watts. Thursday, 11:33 a. m.

WSM NASHVILLE, TENN.; National Life and Accident Insurance Co.; 650 kc., 5000 watts. Wednesday, 5:45 to 6:00 p. m.

WWVA WHEELING, W. VA.; West Virginia Broadcasting Corp.; 1160 kc., 250 watts. Thursday, 6:00 to 6:15 p. m.

If none of these stations are within reach of your radio set, write to the Program Director of your favorite radio station, suggesting that he add Science Service's radio talks on "Science News of the Week" to his schedule. Full information from

SCIENCE SERVICE
Washington, D. C.

Canadian Sulfur

Canada would like to stop buying $3,000,000 of sulfur in the United States every year.

An experimental plant for extracting sulfur from the mineral, iron pyrite, has begun operation in the hope of producing sulfur at a cheaper price than the import cost, Horace Freeman, chemical engineer of Shawinigan, Quebec, told the Canadian Institute of Mining and Metallurgy.

Canada must have sulfur to make the sulfite liquor used in her vast paper industries and to make sulfuric acid. Because the price of paper has dropped and the price of sulfur has risen, there is a demand for home produced sulfur.

Most of America's sulfur is now mined in Louisiana and Texas in a practically pure state. Combined with iron, as the sulfide of pyrite, it is found in large quantities very near Canadian paper mills, but in the past there has been no satisfactory method of extracting it.

Chemistry

Science News-Letter, March 15, 1930

New Neurosis—*Cont'd*

moved from the patients in the old hospital, Salpétrière. This practically marked the beginning of the modern humane treatment of the insane. This was not, however, Pinel's greatest contribution to society. His greatest contribution was in telling the world that he was interested in the unfortunate insane not only in order to help to improve the conditions in which they were living but also to derive from the study of insanity information that would lead to a more intelligent understanding of human nature.

If the people who were responsible for the formulation and enactment of the Eighteenth Amendment had been familiar with Pinel's views and had known a little more about the condition we describe as insanity they would not have advised American citizens to adopt an emotional and mental attitude toward life that is characteristic of the insane and not the sane.

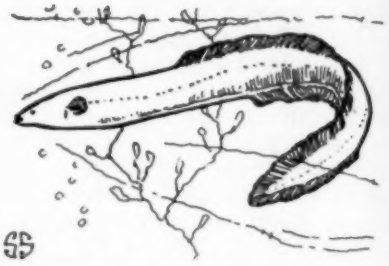
The emotional and mental disorders that were collectively described as shell shock in the World War threatened at one time to interfere seriously with the fighting efficiency of armies.

In time of peace emotional and mental disorders that may be described as "prohibition-shock" interfere with the attempts we make to adjust our lives on a temperate, sane, and reasonable basis.

Science News-Letter, March 15, 1930

NATURE RAMBLINGS

By Frank Thone



"Irish Snakes"

"'Praties an' fishes are very good dishes
For Patrick's Day in the mornin'!"

So runs the rime that goes with the only Irish jig tune that most of us know. It is a good, lively tune, and there are other—and better—words for it; but the education of a lot of us has been sadly neglected in such matters.

And if fishes, why not eels? The good saint whose memory we shall celebrate next Monday of whatever race we be, is reputed to have driven the snakes out of Ireland, but fortunately he spared the island its eels. The slow rivers of Ireland have their good share of this toothsome though snaky-looking fish, and pronging for eels has had its practitioners there even before the days of St. Patrick.

Eels are among the strangest of fish in habits and life-history as well as in outward form. They are migratory fish, like salmon; but unlike salmon they descend to the sea to breed and ascend the rivers to live out their lives. Mature eels go down to the sea in vast numbers. All the eels from western Europe congregate in the southern part of the North Atlantic, produce their eggs, and die. The young eels —elvers, they are called—find their way back home without guides, and re-stock the waters. Our own North American eels make a similar migration, their breeding ground being somewhat to the north of that of their European brethren.

It is rather a pity that we Americans have not cultivated more of a taste for eel, for it is really very good eating. Our cousins "in the Old Country" appreciate it better. In some parts of Europe smoked eel is in high favor, and anybody who has ever tried it will tell you that smoked eel is just about all that could be desired in the way of *hors d'oeuvres.*

Science News-Letter, March 15, 1930

Be a Radio Amateur!

OWN AND OPERATE YOUR OWN SHORT-WAVE SENDING STATION

WOULDN'T you like to have your own home-made station and talk to your friends all over the world by dots and dashes? 25,000 radio amateurs in every country of the globe are doing it, 17,000 of them right here in the United States. Join them and get in on the fun. It can be done easily and cheaply!

Every evening thousands of amateurs talk to each other over their home-made stations in almost every city and village in the land, sending messages back and forth. You can do it too! Imagine the thrill of communicating anywhere you wish, of making hundreds of new friends over the air.

When storms destroy the telegraph lines in your community you can help in the emergency communication for which amateurs are famous. You can send messages almost anywhere, you can tune in and talk with polar exploring parties and expeditions in the jungles! Amateur radio is the most entrancing of hobbies.

Send 10c for This Booklet Which Tells You How!

The amateur's association has prepared a fascinating booklet that tells the story of becoming an amateur from start to finish. It tells you about the short waves, how to get started, how to build a fine but simple transmitter and receiver at home from inexpensive parts, how to learn the code easily, how to talk to other amateurs in amateur language, how to operate your station. Everything is here and in simple words—nothing left out. Complete descriptions, detailed instructions, many clear illustrations, and written so *you* can understand it.

Send in your 10c *to-day for a copy of "How To Become A Radio Amateur." It will start you in the most thrilling hobby you ever entered, and we'll guarantee it will be the biggest dime's worth you ever received!*

AMERICAN RADIO RELAY LEAGUE

1712 Park Street, Hartford, Connecticut

PRACTICAL CHEMISTRY

(Revised)

By N. Henry Black, Assistant Professor of Education, Harvard University, and James Bryant Conant, Assistant Professor of Chemistry, Harvard University.

A textbook in chemistry for high schools which is thoroughly modern in its point of view. Theories are introduced only in so far as they explain the essential facts of chemistry, and every effort is made to connect laws and principles with daily life.

It is written in a clear, interesting style readily understood by pupils. It is particularly notable in its careful step-by-step development of some of the hard subjects in chemistry, such as the writing of chemical equations and chemical computations. There are many fine illustrations, mostly half-tones, and diagrams which are really helpful. Notable features of the revised edition are: (1) addition of new, up-to-date material; (2) descriptions of several new processes made necessary because of the constantly widening application of chemistry to industry, such as: welding by atomic hydrogen, the Claude Process of the Fixation of Nitrogen, reclaiming rubber, and the new types of pyroxylin paints and lacquers. The book offers many aids for teaching, such as: suggestions for classroom demonstrations, concise summaries, thought-provoking questions, and ingenious stimulating and workable topics for further study. It fully meets the recommendations of the College Entrance Examination Board.

Fabrikoid. 12°, *ill.* 474 *pages.* $1.80.

The Macmillan Company

New York *Atlanta*
Chicago *Dallas*
Boston *San Francisco*

Glands of Mystery—*Continued*

tempts to overcome this condition, chiefly through increased stimulation by increased functions of the adrenal glands. In some of these patients, the adrenals are easily able to meet the extra strain. In others they are not, and then in time of emergency, when they would ordinarily be able to save the patient's life, they have not the extra bit of necessary power, and death occurs.

Whatever the functions and meaning of the thymus may be in man, it plays an indispensable part in the life of the lower vertebrate animals. Dr. Oscar Riddle of the Carnegie Institution found that in some pigeons which had formerly produced normal eggs the thymus became very much smaller, after which the pigeons laid eggs in which the egg-envelopes were only partially or very imperfectly formed. The shells were thin and the albumen was greatly reduced in amount and modified chemically. When these pigeons were fed on extract of ox thymus, they again laid eggs in which all the egg envelopes were perfectly normal. Curiously, however, the removal of the thymus in young birds did not prevent these birds from producing normal eggs when they grew up.

Dr. Riddle has suggested that the thymus may in reality be a sort of "mother to the race" because the higher animals, including man, could not have come into existence without it. While our remote ancestors lived in the water, Dr. Riddle explained, their thymus glands made possible the production of perfect egg envelopes in which the young were cradled and protected until they were ready for an independent life.

While the thymus remains a mystery, probably even less is known about the pineal gland.

It is a tiny structure, generally said to be about the size of a pea. It gets its name from its cone-like shape. Like the thymus, it is larger in children than in adults. It is also larger in the female than in the male. At one time this mysterious little gland was called the seat of the soul.

It is interesting to know that its structure is the same as that of the eye of reptiles and in fact, the pineal was once considered a third eye, and may possibly have been so in the reptilian stage of evolution. However, in no form of animal living at present does the pineal retain an ocular function of high order.

The color reactions of certain anials such as tadpoles and chameleons depend on the eye. Some investigators have found that feeding pineal substance to tadpoles causes contraction of the pigment cells of these tiny creatures, even when no change in environment has taken place.

Tumors of the pineal gland have been associated with sexual precocity. When a little boy grows rapidly, so that he becomes very large for his age, with arms and legs particularly long and out of proportion, and when he appears very precocious, both mentally and sexually, and also suffers from headache, vomiting and visual disorders, he is probably the victim of a pineal tumor.

Curiously enough, this condition is confined to the male sex. Tumors of the pineal in little girls do not have this same effect. The mental precocity is usually surprising as well as the advanced sexual development, which is both structural and functional. The intelligence quotient is sometimes as high as 140 in these youths. The condition almost always ends fatally. It is practically impossible to remove the tumor. Treatment with X-rays is sometimes resorted to. Pineal tumor, because of pressure on other structures of the brain, also sometimes causes the condition known as hydrocephalus, or water on the brain. The very large head and prominent forehead are characteristic signs of this condition.

Science News-Letter, March 15, 1930

Staff of Science Service—Acting Director, Vernon Kellogg; Managing Editor, Watson Davis; Staff Writers, Frank Thone, James Stokley, Emily C. Davis, Jane Stafford, Marjorie Van de Water, J. W. Young; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

Board of Trustees of Science Service—*Honorary President*, William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, *President*, Editor, Science, Garrison, N. Y.; D. T. MacDougal, Director, Desert Laboratory, Tucson, Ariz.; Dr. Raymond Pearl, Director, Institute for Biological Research, Johns Hopkins University, Baltimore, Md. Representing the National Academy of Sciences, John C. Merriam, President, Carnegie Institute of Washington; R. A. Millikan Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, California; David White, Senior Geologist, U. S. Geological Survey. Representing National Research Council, Vernon Kellogg, *Vice-President and Chairman of Executive Committee*, Permanent Secretary, National Research Council, Washington, D. C.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, *Treasurer*, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

Trade Diseases—*Continued*

This gives rise to Crudities, great plenty of Flatus's, a Paleness and Meagreness all over the Body, the Parts being rob'd of their nutritious Juice; and in fine, all the Dammages that follow a *Cacochylia,* or faulty Chylification. Accordingly we find, that Studious Persons, tho' naturally of a jovial merry Temper, do in process of time become Melancholy and Heavy. We may say commonly, that Melancholick Persons are Ingenious; but we have more Reason to say that Ingenious People turn Melancholick, the more spirituous Part of their Blood being consum'd in the Exercise of the Mind, and only the earthy drossy Part left behind.

I do not deny, but that this Disorder may be considerably promoted by a Temperament of the Body that tends gradually to Melancholy, with a moderate mixture of the other Humours. *Ficinus* in the Book he writ for the Benefit of Studious Persons, gives several Reasons why Learned Men grow Melancholick, some of which he takes from natural Philosophy, and others from Astronomy, which was his chief Study; but all of 'em run upon the violent Motion and Dissipation of the Animal Spirits, that makes the Blood Black and Thick. We conclude therefore, that Learned Men are commonly subject to Melancholick Fits, especially if they are naturally of such a Constitution: And accordingly we find the thorough paced Scholars are Thin, Lean, wan Colour'd, Morose, and Lovers of a Solitary Life.

Science News-Letter, March 15, 1930

A five-passenger airplane will be used by the African hunting expedition of Baron Louis de Rothschild, to conduct the party quickly from Alexandria to Nairobi.

An earthquake in New York State recently proved useful when it loosed several underground streams and filled reservoirs with much needed water.

The first parachute demonstration in America was made in 1837 in Philadelphia by John Wise, who released a cat and a dog with two small parachutes.

A 40-ton stone bull which guarded the palace of an Assyrian king, 800 B. C., is now to stand guard in the Oriental Institute of the University of Chicago.

Airplane Camera Reveals Hidden Canals

Archæology

AN elaborate system of canals built by Indian engineers somewhere about 1200 A. D., and now almost entirely lost to view, has been successfully mapped by the penetrating eye of the airplane camera. The mosaic map of what might be called invisible ruins was made from a U. S. Army plane and by an army photographer. Neil M. Judd, archaeologist of the U. S. National Museum, supervised the aerial survey over the Gila and Salt River valleys, in Arizona.

Preliminary reports from the army officers reassure Mr. Judd that the photographs achieved their purpose, though the work of developing and arranging the negatives is not complete. The pictures were taken from an altitude of about two miles.

The magic ability of airplane photography to bring back into existence the plans of vanished buildings surprised the people of England when Major O. G. S. Crawford showed that his air pictures could record the plans of Roman towns and fortresses long since plowed over. Now, Mr. Judd has shown that the same magic works for America's prehistory.

Only forty years ago, the lines of 400 miles of the prehistoric canals and laterals could be seen in central Arizona. Now, not more than 40 miles of this remarkable engineering work can be observed from the ground. The land which the Pueblo Indians irrigated so that they could raise their corn, beans and squashes is now green with alfalfa, citrus and date groves, fields of lettuce and cotton. The Coolidge Dam stores water for much of this farming.

The plan to study the Indians' system of irrigating this region was proposed by Senator Carl Hayden of Arizona, Mr. Judd stated. Last summer Senator Hayden noticed that where Indian reservation land was being prepared for irrigation the workmen were pulling up cactus, mesquite and other growth at the rate of twenty acres a day and filling in the ancient canals. He felt that some record of the old American engineering should be quickly made.

In many cases an airplane observer 2,000 feet up can see with his own eyes the course of the old canals, Mr. Judd found. Describing these observations and his study on the ground, Mr. Judd stated that the engineering of the Indians was sound. Their ideas were so sound, indeed, that many of the modern canals of the region, dug with steam shovels, have followed the same contours and approximately the same gradient. The Indians had to dig their canals with nothing better than stone tools and sticks. The loosened material was carried off in baskets. They had no metal, no beasts of burden.

Both the Pueblos and modern engineers have followed the same course of constructing canals and later abandoning them in favor of new ones, Mr. Judd explained. From the air it was possible to find points where one of the early Indian canals was cut across by a later one.

White settlers who first went into the Southwest made good use of the Indian engineering plans. One Mormon group which settled near the town of Mesa in the eighteen-seventies dug a canal in one of the courses set by Indians many centuries before, and a part of that canal is in use today, Mr. Judd said.

Science News-Letter, March 15, 1930

Mining Hazards

Coal miners are not the only men who work under the ground in great danger to life and limb.

Metal miners must face a far greater variety of dread gases than coal miners, the most important of which is carbon monoxide, which strikes without warning and with uncanny fatality, D. Harrington and E. H. Denny, two experts of the U. S. Bureau of Mines, said.

"Some of the heaviest losses in metal mine fires have resulted from the burning of less than a railroad freight car, or only a few cords of timber," they said. The deadly fumes given off are sufficient to kill several hundred men if trapped in poorly ventilated places so frequently found in the relatively well ventilated metal mines.

Workers in tunnels and excavations for deep foundations need protection, too, they claimed. "It is high time for drastic action that will put such work on a higher plane as to safety, with particular reference to lighting, use of electricity and ventilation," the experts said. Methane, formed from wood in contact with water, and carbon dioxide, resulting from the decay of wood, are the chief dangers here.

Mining

Science News-Letter, March 15, 1930

FIRST GLANCES AT NEW BOOKS

BIOLOGICAL PRINCIPLES—J. H. Woodger—*Harcourt, Brace* ($7). This is not a book for such unhappy souls as have fled from physical to biological science as a means of escape from thinking. It collates all the principal lines of philosophic approach to biological problems now extant, and judicially sets opposing concepts off against each other without especially endeavoring to thrust a verdict upon the reader. But it does place before him most urgently the desirability of doing some hard thinking on his own part.

Philosophy
Science News-Letter, March 15, 1930

PERENNIALS OF FLOWERLAND—Alice T. A. Quackenbush—*Macmillan* ($1.50). A companion volume to the author's Annuals of Flowerland, this book presents in compact form the essential botanical facts and horticultural hints about a large number of perennial herbaceous ornamentals.

Horticulture
Science News-Letter, March 15, 1930

AN ALEUTIAN BURIAL—Edward Moffat Weyer, Jr.—*American Museum of Natural History* (25c). Description of a sarcophagus containing four remarkable "mummies" of the far north discovered by the Stoll-McCracken Arctic Expedition of 1928.

Archaeology
Science News-Letter, March 15, 1930

THE NATURAL RESOURCES OF GEORGIA—R. M. Harper—*University of Georgia* ($1). This brochure constitutes a study made for the bureau of business research of the University of Georgia school of commerce. The author has spent a lifetime studying in the Southeast the geology, botany, zoology and demography which he here presents as an economic synthesis.

Economics
Science News-Letter, March 15, 1930

DE OCULIS—Benevenutus Grassus-Casey A. Wood—*Stanford University Press* ($5). This treatise on the eyes by Benevenutus Grassus of Jerusalem was for over 500 years the most popular ophthalmic manual of the Middle Ages, according to Dr. Wood, who has made an annotated translation with illustrations from the first printed edition (Ferrara, 1474). The book has a handsome format and will be a pleasing addition to any medical library.

Ophthalmology—Medical History
Science News-Letter, March 15, 1930

INDUSTRIAL MICROSCOPY—L. C. Lindsley—*William Byrd Press* ($4). The book is a combination text and laboratory outline designed to teach students of chemistry how to make the microscope help them in industri chemistry. Dr. Lindsley, who was formerly head of the department of chemistry at the College of William and Mary, taught the subject at the summer school of Columbia University. The book is well illustrated.

Chemistry
Science News-Letter, March 15, 1930

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA, 1929, SECTION V: BIOLOGICAL SCIENCES—*Royal Soc. of Canada.* Contains papers on animal anatomy and physiology, and on plant morphology and ecology.

Botany
Science News-Letter, March 15, 1930

THE CREED OF A BIOLOGIST—A. S. Warthin—*Hoeber* ($1.50). The author endeavors to build up, on the basis of reason and of scientific knowledge alone, a creed which will satisfy him who has rejected the older religious sanctions.

Philosophy
Science News-Letter, March 15, 1930

AN ESKIMO VILLAGE—Samuel King Hutton—*Macmillan* ($1.25). The home life of the Eskimos of Labrador has received less attention than the ways of many other distant peoples. This informally written account tells of the experiences of a visitor who settled down for a time as a neighbor to Eskimo villagers.

Travel
Science News-Letter, March 15, 1930

INSECT WAYS—C. M. Weed—*Appleton* ($2.50). Studies of insects, their habits and their life problems, presented simply enough for a child to understand yet so interestingly that grown-ups will be glad to read them. The lists of review questions at the back of the book increases its value for use as a nature study text.

Entomology
Science News-Letter, March 15, 1930

THE PROGRESS OF BIOLOGICAL CONTROL OF PRICKLY-PEAR IN AUSTRALIA—Alan P. Dodd—*A. J. Cumming, Brisbane.* A hopeful report of gains made in Australia's battle against their worst plant pest, which was imported from America. An especially interesting item is an appendix listing 143 known insect enemies of the prickly pear.

Botany—Entomology
Science News-Letter, March 15, 1930

MILESTONES, 1830-1930—*The Boston Society of Natural History* ($3). Any society, upon reaching its hundredth anniversary, naturally feels entitled to celebrate; and considering the vicissitudes of even corporate existence on this uncertain planet everybody can understand and sympathize with this feeling. But the Boston Society of Natural History has done a great deal more than merely survive, as the pages of the present beautifully gotten up *Festschrift* very properly publish to a world of congratulating neighbors.

History of Science
Science News-Letter, March 15, 1930

COLLECTIONS OF OBJECTS OF RELIGIOUS CEREMONIAL IN THE UNITED STATES NATIONAL MUSEUM—Immanuel Moses Casanowicz—*U. S. Government Printing Office* (90c). Almost forty years ago the National Museum began to assemble exhibits to show the history of religious ideas. The aim as expressed in this bulletin was "to interest the people in the history of religion by leading them to the unknown, as it were, in the terms of the known." The first religions on which collections were formed were Judaism, Christianity, and Mohammedanism. The collection now includes many remarkable objects representing these religions and also Hinduism, Buddhism, Parseeism, and Shinto. Seventy-five plates illustrate the bulletin.

Ethnology—Archæology
Science News-Letter, March 15, 1930

A RAW SILK CLASSIFICATION WITH METHODS OF TESTING—*Silk Association of America.* Seven tests of raw silk are explained. A classification is recommended in the hope that it will serve as a standard of reference and develop into both a national and international standard.

Economics
Science News-Letter, March 15, 1930

VEGETATIVE PROPAGATION FROM THE STANDPOINT OF PLANT ANATOMY—J. H. Priestly and Charles F. Swingle—*U. S. Government Printing Office* (35c). Physiological-morphological studies with important implications for horticulture.

Botany
Science News-Letter, March 15, 1930

THE AUTOMOTIVE MECHANIC'S HANDBOOK—C. T. Schaefer—*Harper* ($4). A concise but very complete compendium of automobile ills and their remedies, written to be of practical value to the mechanic.

Engineering
Science News-Letter, March 15, 1930

Punch Here to Fit Science News-Letter Binder Cover